# Redesign of Miter Gate Pintle Sockets and Connections

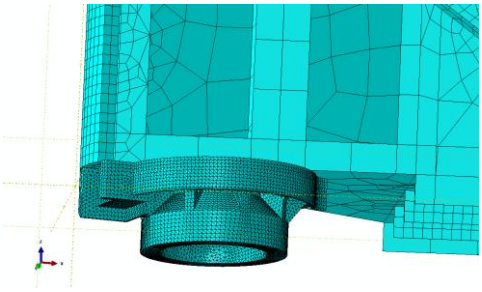
## Problem

Current design of miter gate pintle sockets and connections used by the Corps of Engineers is a rigid design and has no allowance for energy dissipation when gaps are present in the contact blocks due to wear, corrosion, poor installation or minor movement of the gate. If gaps between the contact blocks are present, there will almost certainly be pintle damage or sheared pintle bolts discovered during dewatering of the locks. The gap between the gate and the contact blocks and quoin blocks can be from wear, corrosion, initial out of tolerance gap, or travel of the gate.

Damaged Pintle Socket, Aberdeen L&D

## Approach

This research will result in a new design for Miter Gate Pintle Sockets and Connections. The new design will be flexible in that it will be able to withstand deterioration of design boundary conditions (gaps between quoin blocks and contact blocks) without resulting in damage to the Pintle Socket or connections (welds and bolts). An existing Finite Element Model (FEM) will be modified and improved for this project and will be enhanced such that it will be useful on future site-specific projects. The up-graded FEM will be used to model the present (rigid) design to evaluate loading based on (a) new ideal conditions, and (b) degraded contact block/quoin conditions. It will then be used to model multiple alternative (flexible) designs and perform the same evaluations of loading that were performed for the rigid design. The optimum design will then be chosen. Precision adjustments will be made to the chosen design to optimize performance. Physical model tests will be conducted to verify results of the optimum design determined by the FEM numerical modeling, and any required final precision modifications will be implemented.



Finite Element Model of a Pintle Socket

## Products

The primary product resulting from this research will be a new design for Miter Gate Pintle Sockets and connections that will withstand deterioration of the initial design boundary conditions (gaps between quoin blocks and contact blocks) without damage to the Pintle Socket or connections (welds and bolts). The new design will be suitable for retrofitting existing projects as well as for installation in new projects. Another product will be an improved Finite Element Model and study method that can be used on other site specific projects. Technical transfer will be accomplished with papers, technical notes, and technical reports.

New Pintle Socket

## Benefits

This research will reduce the time and costs associated with damaged pintles by providing a design with a much longer service life. It will also reduce the time and cost associated with unscheduled outages now caused by damaged pintles.

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